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GB 2346039 A   EP 0571124 A1
IEEE Computer Society website:
http://www.computer.org/cise/articles/seti.htm
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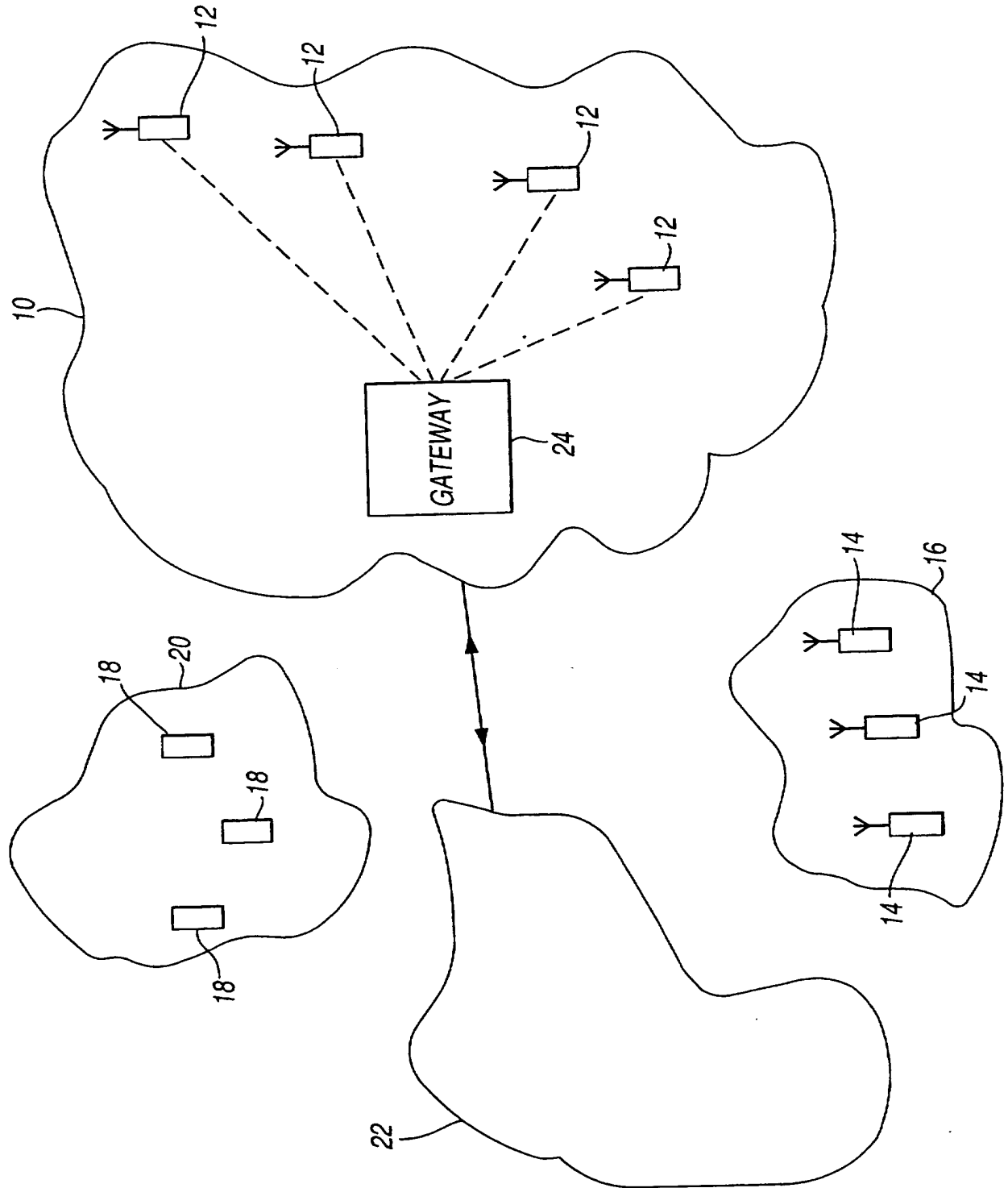Other: Online: WPI, EPODOC, PAJ

(54) Abstract Title
Mobile telecommunications system

(57)   A mobile telecommunications system in which mobile terminals 12 are arranged within a mobile telecommunication network 10 and are organised to perform respective parts of a common data-processing task imposed by a task originator. The results of such performance are returned to the task originator. A gateway 24 may be provided to organise the processing operation and is located between the task originator and the network 10. The system may store data relating to the processing capabilities of the mobile terminals 12 and assign particular tasks on the basis of that capability. This may be part of the gateway 24. The network 10 may be a cellular telecommunications network and mobile terminals 12 perform the data processing task in addition to their normal operation. The data processing task may be a computing task, a data storage task, or a data sensing or collecting task. The task originator may be outside the network and communication may occur via the Internet. The network 10 may be a GSM, GPRS or 3G type.

GB 2 377 587 A
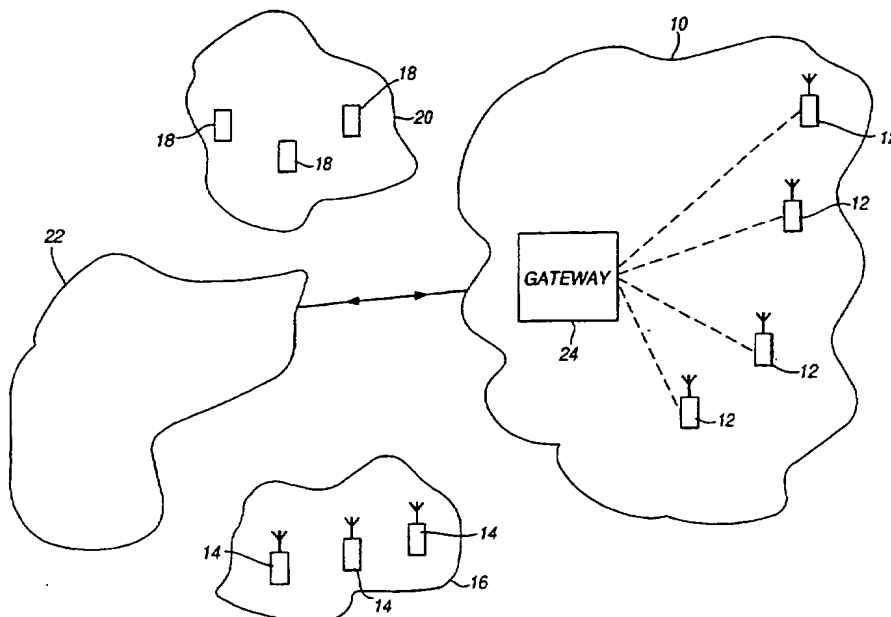
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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GATEWAY

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INTERCONNECTION OF MOBILE TELECOMMUNICATIONS TERMINALS

The invention relates to the interconnection of mobile telecommunications terminals. Embodiments of the invention, to be described in more detail below by way of example only, envisage the interconnection of mobile telecommunications terminals in a manner permitting the terminal, or a group of the terminals, to perform distributed parts of a task, such as a computing task, a storage task or a data sensing and/or gathering task.

According to the invention, there is provided a mobile telecommunications system, in which mobile terminals within a mobile telecommunications network are organised to perform respective parts of a common data-processing task imposed by a task originator and to communicate the results of such performance to the task originator.

According to the invention, there is further provided a method of carrying out a data processing task imposed by a task originator, in which the task is distributed as respective task parts to a plurality of mobile terminals in a mobile telecommunications network, and in which the mobile terminals are organised to perform their respective task parts and to communicate the results of such performance to the task originator.

A mobile telecommunications system embodying the invention, and a method according to the invention of performing distributed parts of a task in a mobile telecommunications system, will now be described, by way of example only, with reference to the

accompanying diagrammatic drawing of one of the systems.

As shown in the Figure, a mobile telecommunications network 10 contains a number of mobile terminals (MTs) 12. The network 10 is envisaged to be of the cellular radio type. The MTs may be mobile telephone handsets or other terminals (e.g. PDAs) capable of voice and/or data communication within the network (for example, with each other) and, via the network, with terminals such as mobile terminals 14 in another mobile telecommunications network 16 or fixed terminals 18 in a fixed network 20, all in known manner. For example, the mobile network 10 may be of the GSM, GPRS or the 3G (UMTS) type.

In known fashion, also, the mobile telecommunications network 10 may be connected or connectable to the Internet 22, permitting communication to be established via the Internet to and from the MTs 12.

In accordance with a feature of the invention, the MTs 12 in the network 10, or some of them, can be arranged to act together, in a manner to be explained in more detail below, to perform individual parts of a task such as may be set up or organised within or from outside of the network.

For example, each MT 12 contains a certain amount of computing power and data storage capability. The amount of computing power and storage capability which is available will

depend on the type of the network and the type of the terminal. A GPRS terminal will in general have more computing power and data storage capability than a conventional GSM terminal, and a 3G terminal will have still more computing power and data storage capability. The amount of computing power and data storage capability available at any time will be affected by the current activity of the terminal (whether it is involved in normal voice or data communication, for example).

Therefore, in accordance with a feature of the invention, a computing task can be broken down into individual parts which can then be distributed and downloaded to at least some of the MTs 12 by the network 10. Each task-part will then be executed on the respective MT 12 and the results then returned via the network to a collation point, such as at the task-originator.

The task-originator of the task may communicate directly with the network and with the MTs involved in carrying out the task. However, the task may be distributed not only to the MTs 12 within the network 10 but to other computing terminals. Such other computing terminals may, for example, be PCs connected to the Internet and/or mobile terminals (e.g. MTs 14) in another mobile network and/or terminals (e.g. terminals 18) in a fixed network 20.

In accordance with another feature, the task may be a data storage task. The task-originator splits up the storage task into individual parts, and the MTs 12 in the network

10 each use their respective storage capability for storing a respective part of the data which can be accessed and read when required by the task source.

Again, the task may be distributed not only to MTs 12 in network 10 but also to other terminals outside the network 10.

In these ways, therefore, the potentially very large total computing power and data storage capability of mobile terminals in a mobile telecommunications network (particularly that computing power and storage capability available when the terminals are not involved in voice or data communication) is made available for carrying out a specific computing or data storage task. The terminals are in this way effectively connected into a "grid" which can be a stand-alone grid or can be part of a global grid interconnecting computing terminals (e.g. PCs) via the Internet or via a more specific widespread infrastructure.

In accordance with another feature of the invention, the MTs 12 may be used as remote sensing nodes. Thus, each MT 12 may have, or may be modified to have, the ability to collect data of a particular description (for example, radio signal strength, temperature, location). The MTs may therefore be organised to collect this data and make it available to a collation point.

The MTs 12 can of course only be used for carrying out the described computing, data storage or remote sensing operations when they are powered on. If connection with an

MT 12 is to be made for such purpose via the Internet, it is of course necessary for the MT 12 to be connected to the Internet. In the case of a GSM terminal, an active step has to be taken to so connect it. GPRS and 3G terminals are considered to be always connected to the Internet (when powered on).

Advantageously, access to and from the MTs 12 taking part in tasks of the different forms described above can be controlled by and/or take place via a gateway 24 forming part of the network 10. This gateway 24 can carry out the function of organising the grid formed by the MTs 12 performing parts of a particular task. In this way, the operator of the mobile network 10 can offer the combined computing and/or storage and/or remote sensing capabilities of the MTs in the network as a resource to an external task-originator; and the task-originator, which may access the gateway 24 via the Internet, for example merely has to provide overall details of the task to the gateway 24 which itself organises the MTs 12 to carry it out.

The network operator can levy a charge for providing the computing, data storage or remote sensing resource to an external task-originator. The customers of the network whose MTs would be used in the implementation of such resource would suffer some detriment, in that (at least) the battery power of their terminals would be involved in extra use. Such subscribers could be offered recompense in various different ways in return for their agreement to allow their MTs to be involved in this way. For example, they could be offered a flat rate reduction in their tariff charge or could be given a reduced charge

or a credit dependent on the number of data bits transacted in carrying out the imposed task parts. Instead, each task part could be broken down into a number of "work units", preferably all of approximately the same size, and the reduced charge or credit given to each MT user could be based on the number of such work units performed.

The extent to which each MT12 can function for the purposes of carrying out the tasks described above will depend on the capabilities and configuration of each terminal: the power of its CPU; its memory and storage capabilities and capacities; the telecommunications bandwidth of the terminal; its expected hours of operation; and other factors. The network 10 can therefore maintain a database providing this information for each MT 12 or for those whose users have in principle agreed to perform a grid task. In this way, therefore, when a particular task is imposed by a task originator, only the MTs capable of carrying out the respective task parts will be selected. Advantageously, the database is held on the gateway 24.

CLAIMS

1.   A mobile telecommunications system, in which mobile terminals within a mobile telecommunications network are organised to perform respective parts of a common data-processing task imposed by a task originator and to communicate the results of such performance to the task originator.

2.   A system according to claim 1, in which the network includes gateway means for at least partly organising the mobile terminals to perform the respective parts of the common task, and in which the task originator communicates with the mobile terminals via the gateway means.

3.   A system according to claim 1, including data storage means in the network for storing information relating to the data-processing ability of the mobile terminals, and selection means responsive to the imposition of a particular data-processing task by a task originator for selecting particular ones of the mobile terminals in accordance with their respective capabilities for performing respective parts of that task.

4.   A system according to claim 3, in which the network includes gateway means for at least partly organising the mobile terminals to perform the respective parts of the common task, and in which the task originator communicates with the mobile terminals via the gateway means.

5. A system according to claim 4, in which the data storage means and the selection means are part of the gateway means.

6. A method of carrying out a data processing task imposed by a task originator, in which the task is distributed as respective task parts to a plurality of mobile terminals in a mobile telecommunications network, and in which the mobile terminals are organised to perform their respective task parts and to communicate the results of such performance to the task originator.

7. A method according to claim 6, in which the network performs the step of at least partly organising the mobile terminals to perform the respective parts of the common task.

8. A method according to claim 6, including the step of storing information in the network relating to the data processing ability of the mobile terminals, and responding to the imposition of a particular data-processing task by a task originator for selecting particular ones of the mobile terminals in accordance with their respective capabilities for performing respective parts of that task.

9. A system or method according to any preceding claim, in which the network is a cellular telecommunications network and in which the mobile terminals perform the respective parts of the common data-processing task in addition to their normal operation

in that network.

10.   A system or method according to any preceding claim, in which the data processing task is a computing task.

11.   A system or method according to any one of claims 1 to 9, in which the data-processing task is a data storage task.

12.   A system or method according to any one of claims 1 to 9, in which the data-processing task is a data sensing or data collection task.

13.   A system or method according to any preceding claim, in which the task originator is outside the network.

14.   A system or method according to claim 13, in which the task originator communicates with the mobile terminals via the Internet.

15.   A system or method according to any preceding claim, in which the mobile telecommunications network is of the GSM type.

16.   A system or method according to any one of claims 1 to 14, in which the mobile telecommunications network is of the GPRS type.

17.   A system or method according to any one of claims 1 to 14, in which the mobile telecommunications network is of a 3G (UMTS) type.

18.   A mobile telecommunications system, substantially as described with reference to the accompanying drawing.

19.   A method of carrying out a data-processing task, substantially as described with reference to the accompanying drawing.

The Patent Office

Application No: GB 0116968.9   i |

Examiner: Andrew Hole

Claims searched: 1 to 19

Date of search: 27 February 2002

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.T): H4L (LDPPX, LRAX, LED, LDGR, LDGX)
Int Cl (Ed.7): H04L 12/28, 12/46; H04Q 7/22
Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2346039 A (IBM Corp.) See whole document, especially page 3, line 29 to 35.	1, 2, 6, 7, 9 to 17.
X	EP 0571124 A1 (IBM Corp.) See Fig 1 and column 3, line 39 to column 4, line 52.	1, 2, 6, 7, 9 to 17.
A	http://www.computer.org/cise/articles/seti.htm Please see print out of web-page.	
Y	http://setiathome.ssl.berkeley.edu/woody_paper.html Please see print out of web-page.	1, 2, 6, 7, 9 to 17.

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
		E	Patent document published on or after, but with priority date earlier than, the filing date of this application.
&	Member of the same patent family		